IN THE CLAIMS:

Please rewrite the claims as follows:

1   1. (Original): A method for enabling parity declustering in a balanced parity array of a

2   storage system, the method comprising the steps of:

3   combining a plurality of unbalanced stripe arrays to form the balanced array, each

4   unbalanced stripe array having parity blocks on a set of storage devices that are disjoint

5   from a set of storage devices storing data blocks; and

6   distributing assignment of storage devices to parity groups throughout the bal-

7   anced array.

1   2. (Original): The method of Claim 1 further comprising the step of, after a single or

2   double storage device failure, ensuring that all surviving data storage devices are loaded

3   uniformly during reconstruction of the failed storage device or devices.

1   3. (Original): The method of Claim 1 wherein the storage system is a filer.

1   4. (Original): The method of Claim 1 further comprising the steps of:

2   dividing each storage device into blocks; and

3   organizing the blocks into stripes across the devices, wherein each stripe contains

4   data and parity blocks from each of the devices of the balanced array.

1   5. (Original): The method of Claim 4 wherein the step of distributing comprises the step

2   of selecting patterns of characters representing data storage devices of a stripe to thereby

3

3   change the association of the data storage devices with parity groups from stripe to stripe

4   of the balanced array.

1   6. (Original): The method of Claim 5 wherein the characters are binary numbers.

1   7. (Original): The method of Claim 5 wherein the characters are ternary numbers.

1   8. (Original): The method of Claim 1 further comprising the steps of:

2   configuring the balanced array as a RAID-4 style array;

3   initially under-populating the array with storage devices; and

4   adding storage devices until a fully populated array of predetermined size is

5   achieved.

1   9. (Original): The method of Claim 8 wherein the storage devices are disks.

1   10. (Original): A system that enables parity declustering in a balanced parity array of a

2   storage system, the system comprising:

3   a plurality of storage devices, each storage device divided into blocks that are

4   further organized into stripes, wherein each stripe contains data and parity blocks from

5   each of the devices of the balanced array;

6   a storage operating system including a storage layer configured to implement a

7   parity assignment technique that distributes assignment of devices to parity groups

8   throughout the balanced array such that all storage devices contain the same amount of

9   data or parity information; and

10   a processing element configured to execute the operating system to thereby in-

11   voke storage access operations to and from the balanced array in accordance with the

12   concentrated parity technique.

1   11. (Original): The system of Claim 10 wherein the storage layer further combines a

2   plurality of unbalanced stripe arrays to form the balanced array, each unbalanced stripe

3   array having parity blocks on a set of storage devices that are disjoint from a set of stor-

4   age devices storing data blocks.

1   12. (Original): The system of Claim 11 wherein the storage devices are disks and

2   wherein the storage layer is a RAID layer.

1   13. (Original): The system of Claim 12 wherein the RAID layer is implemented in logic

2   circuitry.

1   14. (Original): The system of Claim 10 wherein the storage system is a network-

2   attached storage appliance.

1   15. (Original): The system of Claim 10 wherein the storage devices are one of video

2   tape, optical, DVD, magnetic tape and bubble memory devices.

1   16. (Original): The system of Claim 10 wherein the storage devices are media adapted

2   to store information contained within the data and parity blocks.

1   17. (Original): Apparatus for enabling parity declustering in a balanced parity array of a

2   storage system, the apparatus comprising:

3   means for combining a plurality of unbalanced stripe arrays to form the balanced

4   array, each unbalanced stripe array having parity blocks on a set of storage devices that

5   are disjoint from a set of storage devices storing data blocks; and

6   means for distributing assignment of devices to parity groups throughout the bal-

7   anced array such that all storage devices contain the same amount of data or parity infor-

8   mation.

1   18. (Original): The apparatus of Claim 17 further comprising:

2   means for dividing each storage device into blocks; and

3   means for organizing the blocks into stripes across the devices, wherein each

4   stripe contains data and parity blocks from each of the devices of the balanced array.

1   19. (Original): The apparatus of Claim 18 wherein the means for distributing comprises

2   means for selecting patterns of characters representing data storage devices of a stripe to

3   thereby change the association of the data storage devices with parity groups from stripe

4   to stripe of the balanced array.

1   20. (Original): A computer readable medium containing executable program instructions

2   for enabling parity declustering in a balanced parity array of a storage system, the execu-

3   table program instructions comprising program instructions for:

4   combining a plurality of unbalanced stripe arrays to form the balanced array, each

5   unbalanced stripe array having parity blocks on a set of storage devices that are disjoint

6   from a set of storage devices storing data blocks; and

7   distributing assignment of devices to parity groups throughout the balanced array

8   such that all storage devices contain the same amount of data or parity information.

1   21. (Original): The computer readable medium of Claim 20 further comprising program

2   instructions for:

3   dividing each storage device into blocks; and

4   organizing the blocks into stripes across the devices, wherein each stripe contains

5   data and parity blocks from each of the devices of the balanced array.

1   22. (Original): The computer readable medium of Claim 21 wherein the program in-

2   structions for distributing comprises program instructions for selecting patterns of char-

3   acters representing data storage devices of a stripe to thereby change the association of

4   the data storage devices with parity groups from stripe to stripe of the balanced array.

Please insert new claims 23 *et seq.*

1   23. (New) A method for enabling parity declustering in a balanced parity array having a

2   plurality of parity block storage devices and data block storage devices, the method com-

3   prising the steps of:

4   assigning the parity blocks to one of a plurality of parity groups, each parity group

5   having a parity assignment pattern; and

6   assigning the data blocks throughout the plurality of parity groups such that re-

7   covery of a single or double storage device failure requires a substantially equal loading

8   of all the data block storage devices during reconstruction of the failed storage device or

9   devices.

1   24. (New) The method of Claim 23, further comprising: assigning the data blocks so all

2   data storage devices are not fully accessed during reconstruction.

1   25. (New) The method of Claim 23, further comprising: storing substantially the same

2   amount of data or parity information on all of the storage devices.

1   26. (New) The method of Claim 23, further comprising: combining a plurality of unbal-

2   anced arrays to form the balanced array.

1   27. (New) The method of Claim 23, further comprising: using disks as the storage de-

2   vices.

1 28. (New) The method of Claim 23, further comprising: using the Corbett-Park parity

2 assignment pattern.

1 29. (New) The method of Claim 23, further comprising: using a RAID system as the

2 parity array.

1 30. (New) A declustered, balanced parity array, comprising:

2   a plurality of parity block storage devices, the parity blocks assigned to one of a

3 plurality of parity groups, each parity group having a parity assignment pattern; and

4   a plurality of data block storage devices, the data blocks assigned throughout the

5 plurality of parity groups such that recovery of a single or double storage device failure

6 requires a substantially equal loading of all the data block storage devices during recon-

7 struction of the failed storage device or devices.

1 31. (New) The declustered, balanced parity array of Claim 30, further comprising: the

2 plurality of data blocks are assigned so all data storage devices are not fully accessed

3 during reconstruction.

1 32. (New) The declustered, balanced parity array of Claim 30, further comprising: sub-

2 stantially the same amount of data or parity information on all of the storage devices.

1 33. (New) The declustered, balanced parity array of Claim 30, further comprising: a plu-

2 rality of combined unbalanced arrays to form the balanced array.

1   34. (New) The declustered, balanced parity array of Claim 30, further comprising: disks

2   as the storage devices.

1   35. (New) The declustered, balanced parity array of Claim 30, further comprising: the

2   Corbett-Park parity assignment pattern.

1   36. (New) The declustered, balanced parity array of Claim 30, further comprising: a

2   RAID system as the parity array.

1   37. (New) A declustered, balanced parity array, comprising:

2   a plurality of parity block storage devices;

3   a plurality of data block storage devices;

4   means for assigning the parity blocks to one of a plurality of parity groups, each

5   parity group having a parity assignment pattern; and

6   means for assigning the data blocks throughout the plurality of parity groups such

7   that recovery of a single or double storage device failure requires a substantially equal

8   loading of all the data block storage devices during reconstruction of the failed storage

9   device or devices.

1   38. (New) A method for declustering a parity array having a plurality of storage devices,

2   the method comprising the steps of:

3   assigning a first plurality of data and parity blocks to a first parity group; and

4   assigning a second plurality of data and parity blocks to a second parity group, the

5   first and second parity groups being independent from each other and distributed

6   throughout the plurality of storage devices of the parity array.

10

1 39. (New) A method for enabling parity declustering in a balanced parity array, the

2 method comprising the steps of:

3   combining a first unbalanced array having a first parity group with a second un-

4 balanced array having a second parity group to form the balanced array; and

5   reorganizing the first and second parity groups to distribute the parity groups

6 throughout the balanced parity array.

1 40. (New) A method for declustering a parity array having a plurality of storage devices,

2 the method comprising the step of:

3   assigning a plurality of data and parity blocks to a plurality of parity groups, the

4 plurality of parity groups being independent from each other and distributed throughout

5 the plurality of storage devices of the parity array.

1 41. (New) A declustered parity array, comprising:

2   a plurality of storage devices having a first and second parity group;

3   a first plurality of data and parity blocks assigned to the first parity group; and

4   a second plurality of data and parity blocks assigned to the second parity group,

5 the first and second parity groups being independent from each other and distributed

6 throughout the plurality of storage devices of the parity array.

1 42. (New) A declustered parity array, comprising:

2   a first unbalanced array having a first parity group;

3   a second unbalanced array having a second parity group; the first and second un-

4 balanced arrays being combined to form a balanced array; and

11

5   a storage operating system that reorganizes the first and second parity groups to

6   distribute the parity groups throughout the balanced parity array.

1   43. (New) A declustered parity array, comprising:

2   a plurality of storage devices having a plurality of parity groups; and

3   a plurality of data and parity blocks assigned to the plurality of parity groups, the

4   plurality of parity groups being independent from each other and distributed throughout

5   the plurality of storage devices of the parity array.

1   44. (New) A declustered parity array, comprising:

2   a plurality of storage devices;

3   means for assigning a first plurality of data and parity blocks to a first parity

4   group; and

5   means for assigning a second plurality of data and parity blocks to a second parity

6   group, the first and second parity groups being independent from each other and distrib-

7   uted throughout the plurality of storage devices of the parity array.

1   45. (New) A declustered parity array, comprising:

2   means for combining a first unbalanced array having a first parity group with a

3   second unbalanced array having a second parity group to form a balanced array; and

4   means for reorganizing the first and second parity groups to distribute the parity

5   groups throughout the balanced parity array.

1   46. (New) A declustered parity array, comprising:

2   a plurality of storage devices; and

3   means for assigning a plurality of data and parity blocks to a plurality of parity

4 groups, the plurality of parity groups being independent from each other and distributed

5 throughout the plurality of storage devices of the parity array.

1 47. (New) A method of operating a data storage system, comprising:

2   distributing first data on a set of data storage devices;

3   distributing parity relating to said first data on a set of parity storage devices;

4   distributing second data on said set of data storage devices;

5   distributing parity relating to said second data on said set of parity storage de-

6 vices; and

7   arranging said first data and said second data throughout said data storage devices

8 to partially load each data storage device substantially equally during a data recovery op-

9 eration.

1 48. (New) The method of claim 47, further comprising:

2   said arranging step is accomplished by a binary counting method which substan-

3 tially uniformly distributes succeeding stripes over said set of data storage devices.

1 49. (New) The method of claim 47, further comprising:

2   distributing a third data on said set of data storage devices; and

3   distributing parity relating to said third data on said set of parity storage devices.

1 50. (New) The method of claim 49, further comprising:

2 said arranging step is accomplished by a ternary counting method which substan-

3 tially uniformly distributes succeeding stripes over said set of data storage devices.

1 51. (New) A computer readable media, comprising: the computer readable media con-

2 taining instructions for execution in a processor for the practice of the method of,

3 assigning the parity blocks to one of a plurality of parity groups, each parity group

4 having a parity assignment pattern; and

5 assigning the data blocks throughout the plurality of parity groups such that re-

6 covery of a single or double storage device failure requires a substantially equal loading

7 of all the data block storage devices during reconstruction of the failed storage device or

8 devices.

1 52. (New) Electromagnetic signals propagating on a computer network, comprising: the

2 electromagnetic signals carrying instructions for execution in a processor for the practice

3 of the method of,

4 assigning the parity blocks to one of a plurality of parity groups, each parity group

5 having a parity assignment pattern; and

6 assigning the data blocks throughout the plurality of parity groups such that re-

7 covery of a single or double storage device failure requires a substantially equal loading

8 of all the data block storage devices during reconstruction of the failed storage device or

9 devices.

1 53. (New) A computer readable media, comprising: the computer readable media con-

2 taining instructions for execution in a processor for the practice of the method of,

3 distributing first data on a set of data storage devices;

4   distributing parity relating to said first data on a set of parity storage devices;

5   distributing second data on said set of data storage devices;

6   distributing parity relating to said second data on said set of parity storage de-

7 vices; and

8   arranging said first data and said second data throughout said data storage devices

9 to partially load each data storage device substantially equally during a data recovery op-

10 eration.

1 54. (New) Electromagnetic signals propagating on a computer network, comprising: the

2 electromagnetic signals carrying instructions for execution in a processor for the practice

3 of the method of,

4   distributing first data on a set of data storage devices;

5   distributing parity relating to said first data on a set of parity storage devices;

6   distributing second data on said set of data storage devices;

7   distributing parity relating to said second data on said set of parity storage de-

8 vices; and

9   arranging said first data and said second data throughout said data storage devices

10 to partially load each data storage device substantially equally during a data recovery op-

11 eration.